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Report on
Major Thoroughfare Design
for
CHAPEL HILL
NORTH CAROLINA

June, 1959

The preparation of this report was financed in part through an Urban Planning Grant from the Housing and Home Finance Agency, under the provisions of Section 701 of the Housing Act of 1954, as amended.

City & Town Planning Associates
Chapel Hill, North Carolina

John W. Horn, Engineer
Raleigh, North Carolina

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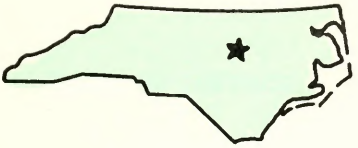

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Box 5533, Stote College Stotion
Roleigh, North Corolino

June 12, 1959

Division of Community Planning
North Carolina Department of
Conservation & Development
Raleigh, North Carolina

Dear Sirs:

We are happy to submit this report on the proposed "MAJOR THOROUGHFARE DESIGN" for Chapel Hill, North Carolina.

This report and the attached five part map titled "PRELIMINARY THOROUGHFARE DESIGN" is submitted in fulfillment of our Agreement for Scope of Services.

Respectfully Submitted,

John W. Horn, Engineer

TABLE OF CONTENTS

Subject	Page
Theoretical Purpose of Streets	1
Basic Types of Streets	
Idealized Street Systems	
Function of Streets	
Field Analysis & Topography	6
Existing Street System	7
Major Street System	
Design Standards	11
Priority of Development	17
First Priority	
Second Priority	
Third Priority	
Thoroughfare Plan	20

INTRODUCTION

Theoretical Purpose of Streets

Basic Types of Streets

Basically, there are five types of streets: the residential street, the collector street, the major thoroughfare, the business street, and the bypass route.

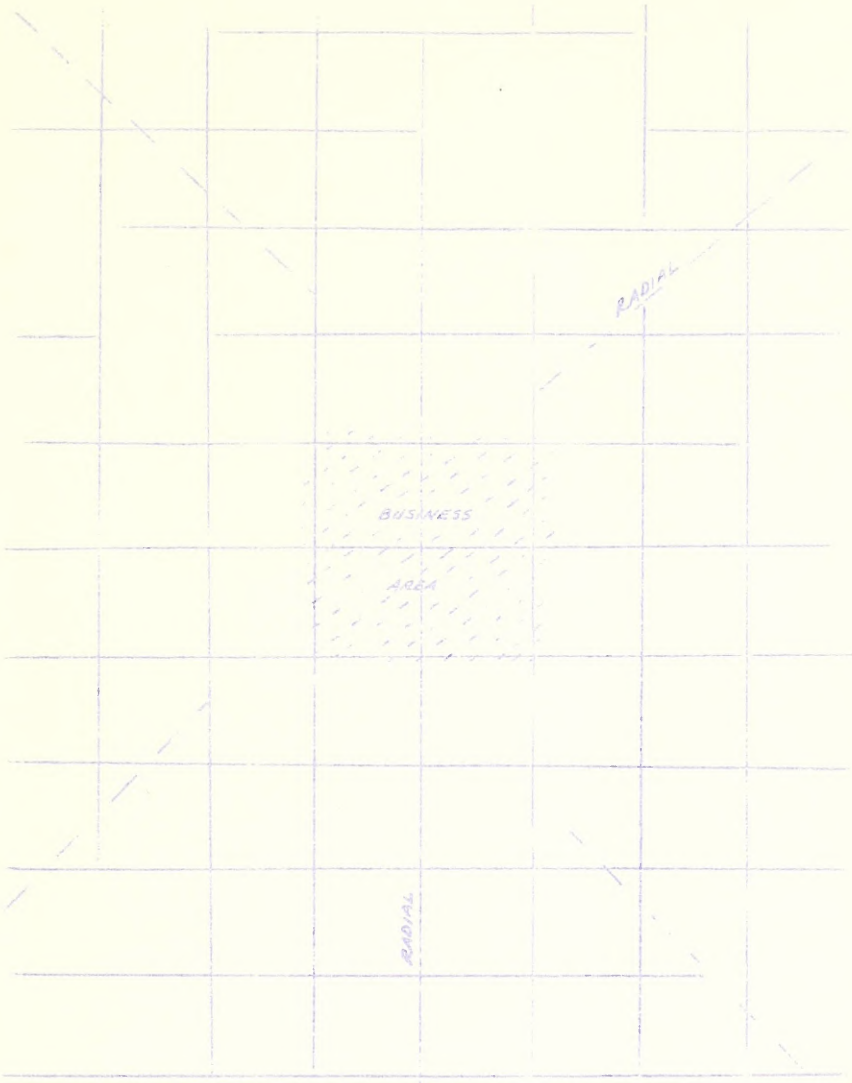
The primary purpose of the residential street is to provide access to the abutting property and to provide a right-of-way for utility services. The primary purpose of the collector street is to serve as a collector from many residential or commercial streets and to move this traffic to or from a major thoroughfare. The purpose of a major thoroughfare is to move large volumes of vehicular traffic as efficiently as possible from one area of the city to another. The primary purpose of the business street is to serve the business traffic, to permit easy movement of traffic within the business area, and to permit efficient access to and from the adjacent cross-town routes. The bypass serves to move rural and regional through traffic around the dense urban area as efficiently as possible, yet provides easy and direct access to the business area by way of the major thoroughfares. It is usually desirable to have limited access on bypass facilities. However, it is often economically necessary to use an outlying major thoroughfare or loop street as a bypass route.

Idealized Street Systems

Street systems are basically of two types or a combination of the two types. One type is based on a "checkerboard" pattern, whereas the other is based on a "radial-circumferential" pattern.

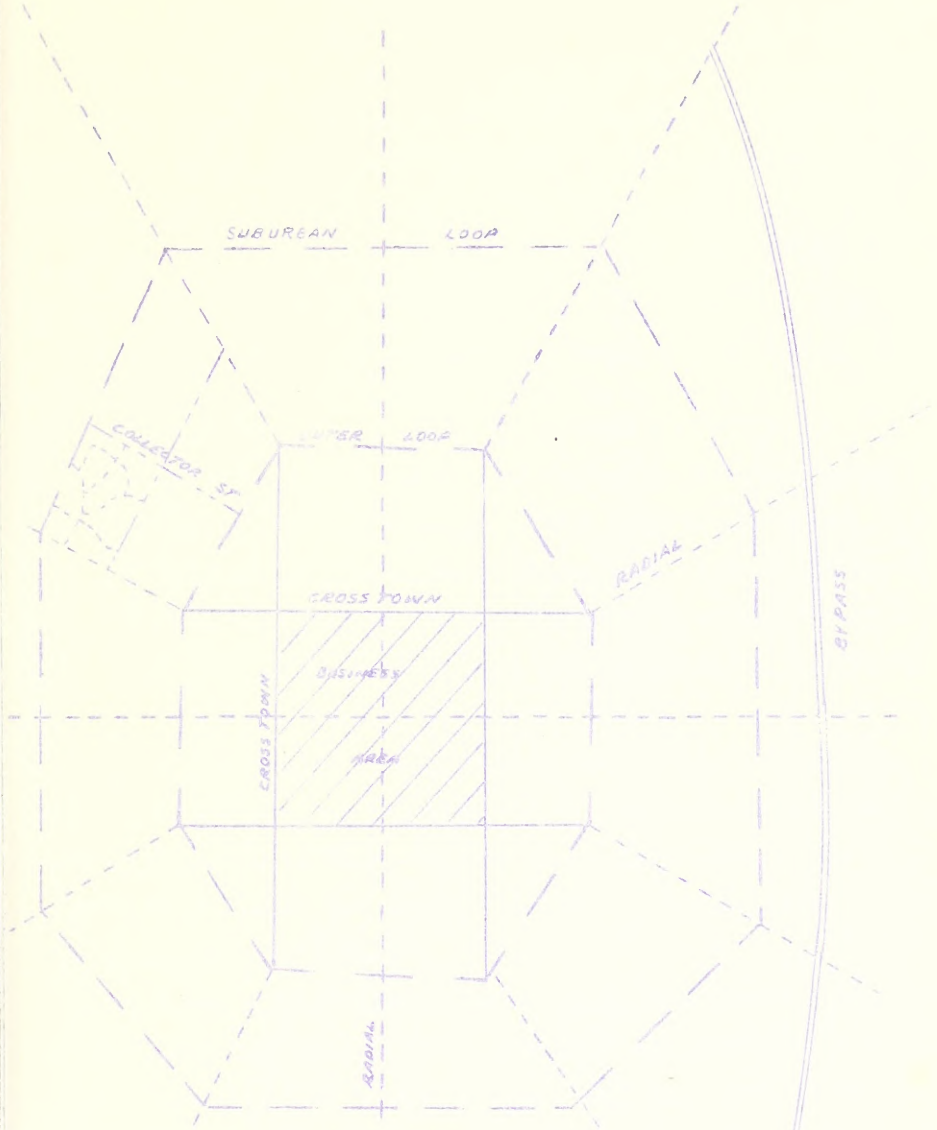
The checkerboard pattern is made up of a series of streets located approximately at right angles (See Figure 1). The principal advantages of such a system are: (1) It is easy to lay out and can be extended indefinitely, (2) It utilizes a simplified utility system, (3) It may be easily subdivided and numbered, and (4) The deed descriptions are easy to write. The major disadvantages of such a system are: (1) It cannot be easily adapted to irregular topography, (2) It is inconvenient for diagonal travel, (3) The uncertainty of travel direction requires an excessive number of streets to be designed as major thoroughfares, and (4) The land-use patterns and land-development patterns are unstable.

The radial-circumferential street pattern is made up of a series of major streets radiating from the center of the city and supplemented by a series of circumferential streets which encircle the city (See Figure 2). Some of the major advantages of such a street pattern are: (1) It is a flexible system which permits good adaptation to the topography, (2) Travel between any two points can usually be made with maximum directness, (3) The major streets are clearly distinguished from minor types of streets, (4) Land development is more stable due to each



Checkerboard Street Pattern

Figure 1



Radial-Circumferential Street Pattern

Figure 2

street having a specific purpose, and (5) There is less street mileage to construct and maintain. The principal disadvantages of this type of street pattern are: (1) It is more difficult to design and lay out, (2) Parcels of land are more difficult to subdivide, and (3) The utility system is more difficult to lay out.

Function of Streets in a Radial-circumferential System

The circumferential or loop street permits traffic to travel easily from one outlying point to another without going through the central business area. These streets are often straight or irregular in alignment rather than circular, and are usually spaced at approximately one mile intervals. Portions of the outer circumferential streets may, in addition, serve as a bypass for a major highway around the city.

The radial streets provide direct connections between the central business area of the town and outlying points. Radials are functional routes which usually adapt themselves to the topography, and which are usually planned to intercept the outer loops at specific locations.

If all the radials were to intersect at one point in the downtown area, they would create unbearable congestion. Hence, it is necessary to have an inner loop around the downtown area in which the radials may terminate. The inner loop, called a crosstown route, provides a route by which the radial traffic may veer off and circle around the congested central business area until it reaches that point closest to its downtown

destination. For like reasons, off-street parking lots and garages should be located adjacent to the crosstown routes, preferably on the inner side. For efficient usage, such parking should be within eight hundred feet of the shopping areas. In addition, the crosstown routes provide a sort of downtown bypass for that intra-city traffic that is attempting to go from one side of the central business area to another.

Field Analysis and Topography

A complete field analysis of the topographic and land use conditions along the alignments of the proposed Sketch Thoroughfare Plan has been conducted. General topographic data for the proposed alignments has been plotted on the attached base maps at a contour interval of 10 feet. The completed Thoroughfare Design, at a scale of 1 inch equals 200 feet, will contain this information.

The topographic data was obtained from the seven and one-half minute series Chapel Hill Quadrangle Sheet published by the United States Department of Interior. The data was carefully transferred to the base maps at a scale of 1 inch equals 200 feet. The topography was further checked in the field and corrections and adjustments were made as applicable.

The topographic information will be used in evaluating the various advantages and disadvantages of alternate alignments in the Thoroughfare Design.

All land use adjacent to the proposed alignments has been field checked and correlated with the detailed land use maps furnished by the Chapel Hill Planning Board.

The effect, impact and influence of the proposed thoroughfare alignments on future land use has been reviewed in detail with the Chapel Hill Planning Board. It has been concluded that the alignments proposed are the most needed and the most applicable in relation to the future land development plans.

Existing Street System

The abrupt rolling topography has caused a number of traffic and planning problems in Chapel Hill. The existing street system has little similarity to an idealized system. The alignment and location of most streets and the location of land development has been adversely effected by the terrain. Today, many of the newer residential areas have grown in a manner such that they completely block the extension of major traffic facilities. In many areas, the only alternatives for extending the major street system is to either widen existing residential streets or attempt to develop entirely new facilities through areas of extreme topography. In other cases, new residential areas have developed outward beyond older residential areas in such a manner that little or no feasible access is available through the completely developed older area.

Major Street System

The basic street pattern in Chapel Hill is made up of radials extending outward from a central core. There are few or no facilities that may be efficiently used for zone to zone, crosstown or looping movements. People desiring to cross from the north side of Chapel Hill to the University Hospital must pass directly through the central business area. In a like manner, traffic desiring to pass from the east to the west and vice-versa must also pass directly through the center of town.

A prime function of a Thoroughfare System of streets is to provide efficient and direct access to all parts of town from all other parts of town. An efficient Thoroughfare System should separate traffic having entirely different objectives. On the other hand, a Thoroughfare System must provide sufficient street capacity for that traffic having the same objective during rush hours.

Raleigh Road is one of the major streets presently serving Chapel Hill as a major radial from the east. However, this route now becomes badly congested and difficult to travel during the rush periods because traffic must pass through the University Campus on either Country Club Road or Columbia Street. In a like manner, all traffic from the south enters by way of Pittsboro Road and becomes congested by the time it reaches downtown by way of Columbia Street. The prime radial from the City of Durham enters on East Franklin Street and

passes directly through the congested central shopping area to West Franklin Street which serves as the prime radial westward. The major radial from the north, Airport Road, also enters directly into Columbia Street, with the downtown intersection of Columbia Street and Franklin Street being the crossroads of practically all traffic in Chapel Hill.

These major streets are all two lane facilities and are the only major traffic moving streets in Chapel Hill. Conservatively speaking, it could be estimated that nearly ninety percent of all business, shopping and work trips made in Chapel Hill travel by at least one of these streets.

To make matters worse, the central area is burdened with large quantities of University Traffic during the peak periods. Prior parking studies in Chapel Hill indicate that the average parker in the downtown area parks for less than one hour. These studies also indicate that the parking spaces have a very high percent of usage. Such a rapid rate of parking turnover is advantageous for business, but it plays havoc with the movement of traffic. Seldom can streets function efficiently if they are required to handle both traffic and extensive parking. Consequently, certain streets must be designed to move traffic whereas other streets may be allowed to handle extensive parking. Remember, a thriving business area must have efficient traffic facilities to and from the central area as well as sufficient and well located parking facilities. One is useless without the other.

Chapel Hill is showing rapid residential growth in several directions. Future land use plans, as proposed by the city, indicate rapidly growing residential areas to the north and to the east. On the other hand, it is anticipated that future University expansion will increase development to the south. Chapel Hill is also bordered on the west by the town of Carroboro and must account for its future growth in planning future traffic facilities. A Thoroughfare Plan, in order to be practical and applicable, must be flexible and adaptable to all variations in future growth.

The details of this Design have been coordinated with all previous planning studies conducted by Chapel Hill. Preliminary designs have been presented before the Chapel Hill Planning Board on two occasions and critiqued in detail.

DESIGN STANDARDS

The width of urban streets should be determined from their use. Residential and collector streets usually require only two traffic lanes and two parking lanes. A thoroughfare street will usually require at least four traffic lanes throughout with added turning lanes at criti cal intersections. In cases where the right-of-way permits, it is highly desirable to use divisional strips along the thoroughfare streets.

Streets in the business area should have at least four traffic lanes if they are two-way, and at least two traffic lanes if they are operated as one-way. In actuality, the outside lane on a business street serves primarily as a maneuvering lane for parkers and consequently moves little traffic during periods of rapid parking turnover.

In this report the design standards are concerned with street widths for moving traffic. The following standards indicate desirable widths for various types of traffic.

Residential Streets: The desirable width for residential streets is a minimum of 32 feet (7-9-9-7) and a maximum of 36 feet (8-10-10-8). Curb and gutter sections should be used throughout. The desirable right-of-way for a residential street will vary from a minimum of approximately 45 feet to a maximum of 60 feet.

Collector Streets: Collector Streets should permit two adequate lanes for traffic and two parking lanes. Having slightly higher volumes and running speeds, collector streets should have a minimum width of 36 feet (8-10-10-8) and a maximum width of 40 feet (8/12-12-8). Curb and gutter sections should be used throughout. The

desirable right-of-way for these streets should be from a minimum of 50 feet to a maximum of 65 feet. Intersections along collector streets commonly need a separate left turn lane for three lane treatment as shown on the enclosed illustration. However, note the critical corner radii that must be sufficiently large to permit easy turning of the corner.

Thoroughfares: When existing streets are widened, the existing right-of-way and the existing structures will largely determine the widths used. In most cases, widening of existing streets will not permit parking along the facility. However, new thoroughfares may provide for parking if sufficient width is available.

Thoroughfares should have at least four lanes for moving traffic. The minimum desirable width for a four lane street is 48 feet. This permits 13 foot lanes against the curb with 11 foot lanes at the center. However, four 11 foot lanes or 44 foot width will suffice under critical conditions without noticeably reducing the street capacity or causing undue hazard.

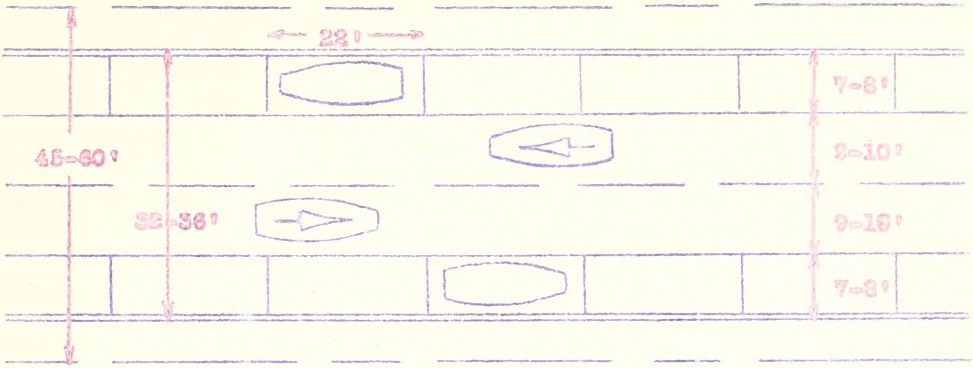
Whenever possible the thoroughfares should have a divisional strip or media at least 4 feet in width, preferably 16 to 20 feet, in order to control left turning across the center line. On very important thoroughfares, additional lanes or special turnouts may be needed for heavy bus loading and unloading problems.

Business Streets: Important business streets in the downtown area, commercial areas or industrial areas, where a high turnover of parking is expected, should have added width in terms of a maneuvering lane for parking vehicles. Parallel parking maneuvers require a total of at least 19 feet from the curb. The parking stalls should be at least 9 feet wide in intensive business and commercial areas.

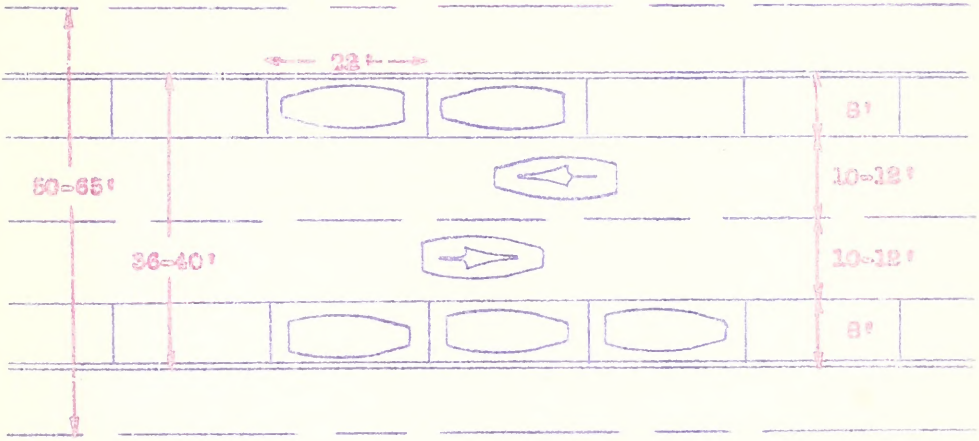
Where commercial vehicles use unloading stalls and busses load and unload, the stalls should be preferably 10 feet wide.

Typical illustrations in this report indicate the various widths described above.

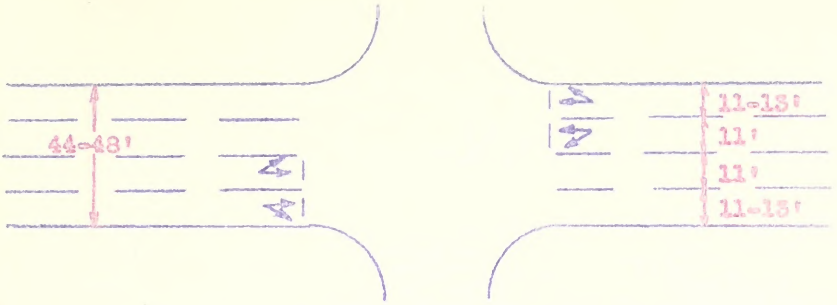
The proposed street plan for Chapel Hill is shown on a sequence of five maps titled "PRELIMINARY THOROUGHFARE DESIGN" which is included as an attachment to this report. Proposed rights-of-way, street widths and number of moving traffic lanes are superimposed on the existing street system at a scale of 1 inch equals 200 feet.



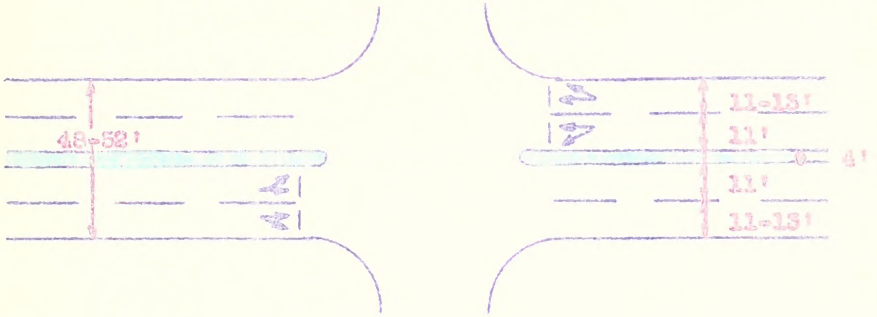
RESIDENTIAL STREET



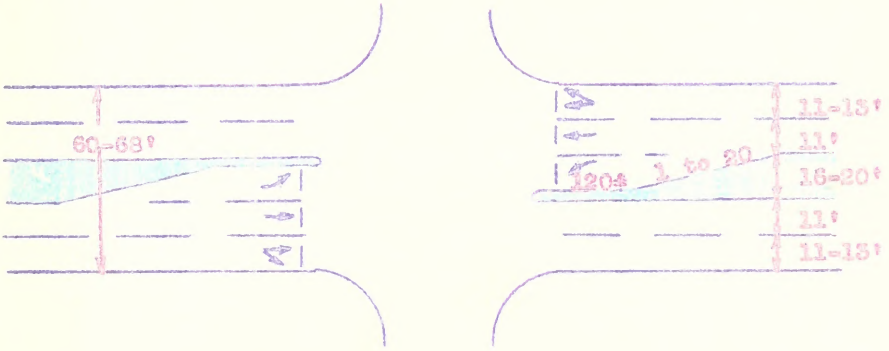
COLLECTOR STREET



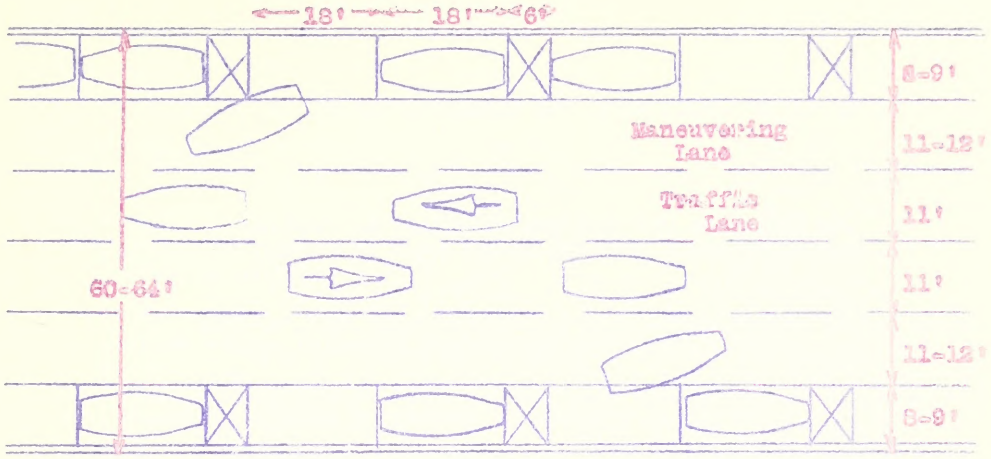
4-LANE UNDIVIDED THOROUGHFARE



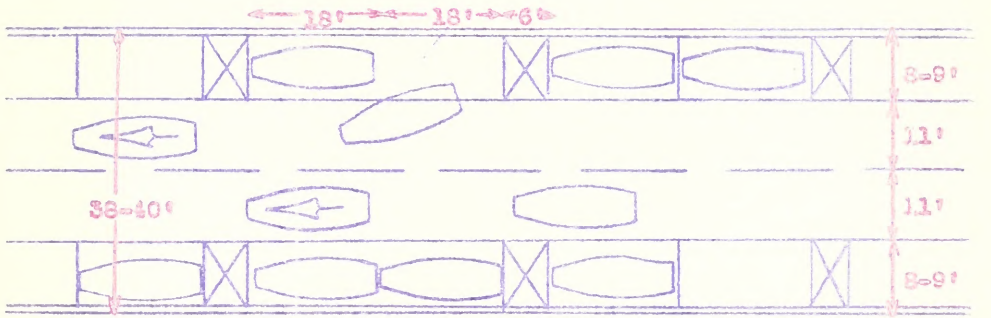
MINIMUM 4-LANE DIVIDED THOROUGHFARE



DESIRABLE 4-LANE DIVIDED THOROUGHFARE



TWO-WAY BUSINESS STREET



ONE-WAY BUSINESS STREET

PRIORITY OF DEVELOPMENT

The following recommendations are considered to be of FIRST PRIORITY;

A-1; The acquisition of right-of-way and the widening of Columbia Street to four lanes between South Road and Cameron Avenue.

A-2; The redesign and improvement of the intersection of South Road, Columbia Street and McGauley Street.

A-3; The acquisition of right-of-way and construction of Boundary Street southward to Raleigh Road.

A-4; The acquisition of right-of-way and construction of the McGauley Street extension westward to Merritt Mill Road; and the extension of Merritt Mill Road southward from Cameron Avenue to McGauley Street.

A-5; Acquisition of right-of-way for the future extension of Rosemary Street eastward to the Durham Road.

A-6; Acquisition of right-of-way and construction of the Ridge Road extension southward to Purefoy Road.

A-7; The acquisition of additional right-of-way along Rosemary Street and Main Street to permit future widening to four lanes.

A-8; The acquisition of right-of-way and construction widening along University Drive, Ransom Street, Kenan Street and Cotton Street to permit widening to 38 feet.

A-9; Acquisition of right-of-way for the future extension of West Franklin Street to the by-pass.

A-10; Acquisition of right-of-way for future northern by-pass facility between Cheek Avenue and Airport Road.

A-11; Acquisition of right-of-way to extend a new facility eastward from the Durham Road to and across the Route 15 by-pass.

A-12; Acquisition of additional right-of-way along Pittsboro Road.

The following recommendations are considered to be of SECOND PRIORITY;

B-1; The acquisition of right-of-way and the widening of Raleigh Road to 4 lanes divided.

B-2; The construction widening of South Road and McGauley Street to 4 lanes.

B-3; The construction of East Rosemary Street extension to the Durham Road.

B-4; The acquisition of right-of-way and the construction widening of Durham Road to 4 lanes divided.

B-5; The widening of Rosemary and Main Streets to 4 lanes.

B-6; The construction of West Franklin Street extension to the by-pass.

B-7; Construction of a new facility eastward from the Durham Road to and across the Route 15 by-pass.

B-8; The construction widening of Pittsboro Road to 4 lanes.

B-9; Acquisition of right-of-way for new facility between Hillcrest Avenue, Airport Road and the Durham Road.

B-10; Acquisition of right-of-way to widen the west side crosstown facility along Merritt Mill Road, Graham Street, and Sunset Drive as a one-way pair.

B-11; Acquisition of right-of-way to extend Sykes Street northward.

B-12; Acquisition of additional right-of-way to widen Popular Avenue, Fowler Street, McDade Street, and new right-of-way to extend McDade Street eastward to East Franklin Street.

B-13; Acquisition of right-of-way to extend Boundary Street northward.

B-14; Construction of a northern loop facility from High Street along Cheek Avenue and Airport Road to Eastwood Lake Drive.

The following recommendations are considered to be of

THIRD PRIORITY;

C-1; Acquisition of right-of-way and construction of Merritt Mill Road extension southward to the by-pass.

C-2; The widening of Merritt Mill Road, Sunset Drive and Graham Streets; and the construction of Sykes Street extension northward.

C-3; The widening and construction of Fowler Street, and the extension of McDade Street eastward to East Franklin Street.

C-4; Acquisition of right-of-way and construction of a new facility extending southward from Eastwood Lake Drive.

C-5; The Construction of Boundary Street extension northward.

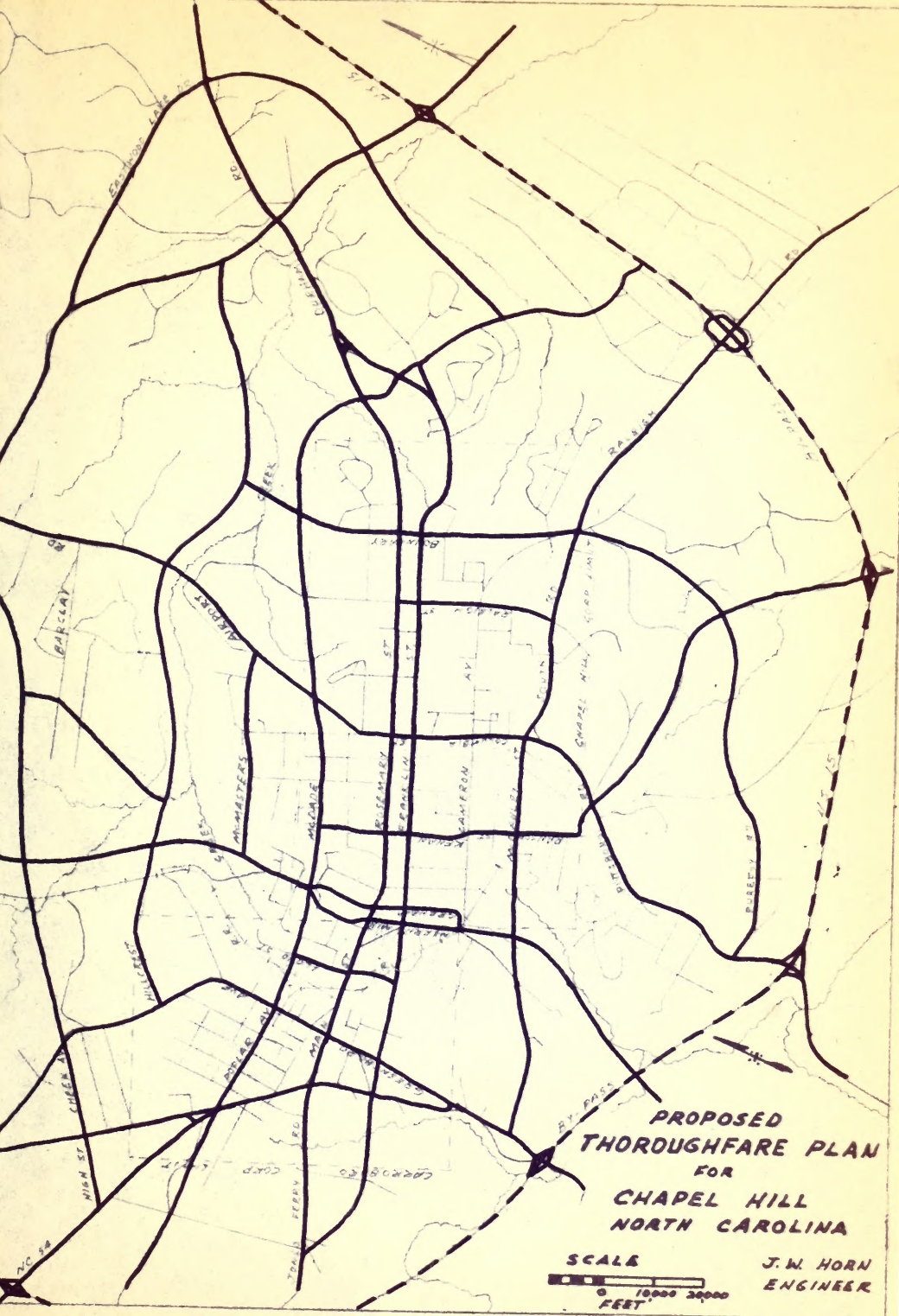
C-6; Construction of the facility between Hillcrest Avenue, Airport Road and Durham Road.

C-7; The construction widening of Merritt Mill Road southward beyond McGauley Street.

C-8; Widening of McMasters Street between Sykes Street and Airport Road.

C-9; The acquisition of right-of-way and construction of the Route 86 extension southward form Main Street to the West Franklin Street extension.

C-10; The acquisition of right-of-way and construction of Lloyd Street extension southward to Merritt Mill Road.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